DOI: 10.7860/JCDR/2025/74550.20646

Case Report

Ayurveda Section

# Application of Leech Therapy in Alleviating Residual Limb Pain following Distal Foot Digit Amputation: A Case Report

YOGESH YADAV[1], SHEETAL ASUTKAR[2]




## ABSTRACT

Residual Limb Pain (RLP) poses a significant challenge in post-amputation care and often necessitates multimodal pain management. Here, a 55-year-old male patient with RLP was managed with *Jalaukavacharan* (leech therapy). The patient had previously undergone amputation of the terminal fingers and toes of the right foot and had inadequate pain relief with Non-Steroidal Anti-Inflammatory Drugs (NSAIDs), prompting him to seek Ayurvedic treatment. Leech therapy was administered daily to the amputated area for seven days, and follow-up assessment was conducted on day 14 using the Visual Analog Scale (VAS). The patient's VAS pain scores decreased significantly, from 8/10 at baseline to 0 on day 14, underscoring the potential of *Jalaukavacharan* as an effective complementary approach for pain reduction in RLP. The clinical implication of this case lies in demonstrating the feasibility and impact of *Jalaukavacharan* for managing persistent post-amputation pain, offering an alternative that aligns with the patient's comfort and preferences. This report contributes to the limited evidence supporting Ayurvedic treatments in pain management and underscores the need for further studies with larger sample sizes to evaluate its broader applicability and effectiveness.


**Keywords:** Analgesia, Ischaemia, Pain management, Phantom limb

## CASE REPORT

A 55-year-old male patient came to Shalya Outpatient Department (OPD) of the institution with complaints of intermittent pain in his amputated terminal fingers and toe of right foot region for the last one year. The patient was a known case of type 2 diabetes mellitus and on regular medication of tab Metformin for 8 years; no history of hypertension and thyroid disorder. He had a significant smoking history for more than 15 years. No significant family history documented. The patient underwent amputation due to severe diabetic ischaemia 15 months back. After amputation, the patient suffered from intractable and severe RLP. The patient had taken oral diclofenac, local application of lignocaine gel, and antidepressants for pain relief but was not satisfied with the treatment.

On general physical examination, the patient's condition was fair, with a blood pressure 130/90 mmHg, pulse rate of 80 beats per minute, afebrile, and $SpO_2$ 99% on room air. Systemic examination revealed normal findings. Blood investigations indicated normal haematological values, with haemoglobin at 12 g/dL. The tests for Human Immunodeficiency Viruses (HIV) and Hepatitis B Surface Antigen (HBsAg) were negative, and the random blood sugar level was 180 mg/dL.

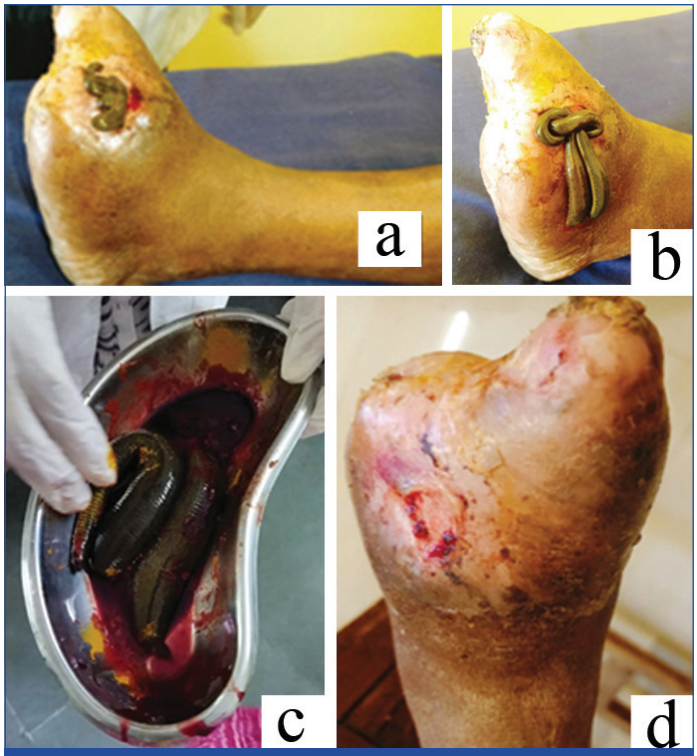
On examination, the amputated stump showed some mild inflammation and tenderness at the site but no signs of infection or tissue necrosis. The patient presented with severe, localised throbbing pain at the amputation site with VAS score of 8/10, affecting the patient's mobility.

In this case, the patient presented with RLP, likely due to an ischemic condition in the foot following amputation, making leech therapy a relevant treatment choice. Exclusion criteria for leech therapy included conditions such as anaemia, HIV, HBsAg positivity, coagulation disorders, or known allergies to leeches. As the patient did not have any of these conditions, no exclusions were applied in this case.

The patient was instructed to lie in a supine position. Three to four, small to medium-sized leeches [Table/Fig-1a] were first activated in normal water containing a pinch of turmeric [Table/Fig-1b], then applied to the pain site in the amputated foot region [Table/Fig-2a,b]. The leeches attached itself within 10-15 seconds, without causing any sensation of pricking pain or discomfort. The leeches were then covered with gauze soaked in normal water. The patient was continuously monitored during the leech suction process. After the process was completed, the leeches detached on their own and their mouth were covered with turmeric powder to induce vomiting of the ingested blood [Table/Fig-2c]. Meanwhile, the post leech therapy wound [Table/Fig-2d] was treated with turmeric powder, and a dressing was applied. Leeches were used daily for seven days, each treatment lasting roughly thirty minutes.

Pain level and other symptoms were assessed routinely as shown in [Table/Fig-3]. The score reduced from VAS score of 8 to 1 at the end of treatment on day seven and at follow-up on day 14 further reduced to a score of 0. The patient spontaneously reported increased comfort, and mobility and had no adverse or unexpected events triggered by the treatment (neither during intervention sessions nor post-treatment).


**[Table/Fig-1]:** a) Small to medium size leeches stored in clean water container; b) Leeches activation by putting them in water with turmeric before *Jalaukavcharan*.




**[Table/Fig-2]:** a&b) Leech sucking impure blood on day 1 and Day 4; c) After *Jalaukavcharan*, Leeches were induced *Vaman* (vomiting) to remove impure blood sucked by them; d) Post *Jalaukavchara*.

| Day | Intervention | VAS score |
|---|---|---|
| Day 0 | Initial assessment | 8 |
| Day 1 | *Jalaukavacharan* | 5 |
| Day 2 | *Jalaukavacharan* | 5 |
| Day 3 | *Jalaukavacharan* | 4 |
| Day 4 | *Jalaukavacharan* | 4 |
| Day 5 | *Jalaukavacharan* | 2 |
| Day 6 | *Jalaukavacharan* | 1 |
| Day 7 | *Jalaukavacharan* | 1 |
| Day 14 | Follow-up assessment | 0 |

**[Table/Fig-3]:** Assessment of VAS score during treatment period and follow-up.

## DISCUSSION

Phantom Limb Pain (PLP) and RLP are challenging conditions experienced by individuals post-amputation. PLP involves sensations of pain in the amputated limb, described as tingling, throbbing, or sharp discomfort, and is linked to changes in peripheral nerves, spinal cord sensitisation, and cortical reorganisation. Psychogenic factors like stress and anxiety also contribute to its persistence. RLP occurs in the remaining limb segment, often due to neuromas or prosthesis issues [1]. RLP and PLP are complex conditions that are often linked to ischemic factors. RLP can result from neuropathy, infection, or poorly fitting prosthetics, while PLP is thought to stem from miscommunication in the nervous system due to nerve trauma. ischaemia, particularly in patients with vascular disease, can exacerbate RLP by reducing blood flow, leading to further complications and pain in the residual limb [2]. Both conditions significantly affect quality of life, necessitating a multifaceted treatment approach that includes medication, physical therapy, and psychological support [3].

Emerging treatments like *Jalaukavacharan* (leech therapy) show promise in alleviating symptoms. Leeches were intended to relieve the pain through active peptides contained in the saliva of leeches with analgesic and anti-inflammatory effects [4].

*Jalaukavacharan*, shows promise in managing PLP and RLP. Their saliva contains various bioactive molecules beneficial for pain management. Hirudin, a potent anticoagulant, inhibits thrombin, thereby preventing blood clotting [5]. Calin also acts as an anticoagulant by preventing the von Willebrand factor from binding to collagen [6]. Destabilase has thrombolytic properties that aid in fibrin dissolution and improve blood flow [7]. Hirustasin and hyaluronidase serve as anti-inflammatory agents and enhance tissue permeability [8]. Tryptase inhibitors help to reduce inflammatory responses by inhibiting mast cell activity [9]. Additionally, histamine-like substances and acetylcholine act as vasodilators, promoting blood flow and alleviating pain [10]. Local anaesthetic agents present in the saliva of leeches provide pain relief by numbing the treated area, offering effects similar to morphine [11].

Leech therapy, or *Jalaukavacharana*, demonstrates notable efficacy in managing pain and inflammation across a range of conditions. In a study on musculoskeletal disorders, leech therapy provided significant pain relief compared to NSAIDs, highlighting its potential as a viable alternative for chronic pain management [12]. Similarly, leech therapy effectively accelerated wound healing in patients with non-healing ulcers, significantly reducing necrotic tissue and stimulating new tissue growth, thereby enhancing wound recovery [13]. In cases of Herpes Zoster and postherpetic neuralgia, leech therapy alleviated severe pain and burning sensations, demonstrating its role in managing neuropathic pain associated with viral infections [14,15]. Moreover, its application in treating thrombosed haemorrhoids and large hematomas has proven effective in reducing pain and inflammation, promoting rapid relief and recovery [16,17]. Even in advanced cancer cases, leech therapy has shown promise in reducing severe pain associated with carcinoma, suggesting its potential in palliative care [18]. Furthermore, leech therapy has been beneficial in treating cellulitis, offering an alternative to conventional antibiotics with fewer side effects [19].

Overall, these case studies collectively underscore the therapeutic benefits of leech therapy in providing anti-inflammatory, analgesic, and vasodilatory effects, making it a valuable adjunct in RLP and PLP. In this Case, the patient reported satisfaction with the treatment, acknowledging pain relief as well as functional gain in daily life. *Jalaukavacharan* was well tolerated by the patients as it is non-invasive and they subsequently felt comfortable during Jalaukavcharan sessions.

## CONCLUSION(S)

*Jalaukavacharan* demonstrated potential therapy for managing RLP following distal foot digit amputation. However, larger-scale studies are essential to substantiate these initial findings, develop standardised protocols, and explore the specific components of leech saliva that may contribute to its effects. With further clinical validation, *Jalaukavacharan* could potentially integrate into existing pain management protocols. Comparative studies with established therapies are also needed to better understand its relative efficacy and long-term impact.

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**PARTICULARS OF CONTRIBUTORS:**
1. Postgraduate Scholar, Department of Shalya Tantra, Mahatma Gandhi Ayurveda College, Hospital and Research Centre, DMIHER, Wardha, Maharashtra, India.
2. Professor and Head, Department of Shalya Tantra, Mahatma Gandhi Ayurveda College, Hospital and Research Centre, DMIHER, Wardha, Maharashtra, India.

**NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:**
Dr. Yogesh Yadav,
Postgraduate Scholar, Department of Shalya Tantra, Mahatma Gandhi Ayurveda College, Hospital and Research Centre, DMIHER, Salod, Hirapur,
Wardha-442001, Maharashtra, India.
E-mail: dryogeshyadav00@gmail.com

**PLAGIARISM CHECKING METHODS:** [Jain H et al.]
- Plagiarism X-checker: Jul 30, 2024
- Manual Googling: Nov 11, 2024
- iThenticate Software: Nov 13, 2024 (4%)

**ETYMOLOGY:** Author Origin

**EMENDATIONS:** 6

**AUTHOR DECLARATION:**
- Financial or Other Competing Interests: None
- Was informed consent obtained from the subjects involved in the study? Yes
- For any images presented appropriate consent has been obtained from the subjects. Yes

Date of Submission: **Jul 27, 2024**
Date of Peer Review: **Oct 12, 2024**
Date of Acceptance: **Nov 15, 2024**
Date of Publishing: **Feb 01, 2025**